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**CLAIMS**

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(57) [Claim(s)]

[Claim 1] In two or more radio terminal stations arranged arbitrarily it is (1). The 1st radio terminal station transmits search wording of a telegram addressed to the 2nd radio terminal station.

(2) When other radio terminal stations receive this search wording of a telegram add and broadcast identification data of this radio terminal station again to this search wording of a telegram.

(3) It is (2) until the 2nd radio terminal station receives said search wording of a telegram. Operation is repeated.

(4) When the 2nd radio terminal station receives said search wording of a telegram return an identification data sequence added to this search wording of a telegram to the 1st radio terminal station.

(5) Memorize a returned identification data sequence as a transmission path to said 2nd radio terminal station in the 1st radio terminal station.

A transmission path searching method characterized by things.

[Claim 2] In two or more radio terminal stations arranged arbitrarily it is (1). The 1st radio terminal station transmits search wording of a telegram addressed to the 2nd radio terminal station.

(2) When other radio terminal stations receive this search wording of a telegram add and broadcast identification data of this radio terminal station again to this search wording of a telegram.

(3) It is (2) until the 2nd radio terminal station receives said search wording of a telegram. Operation is repeated.

(4) When the 2nd radio terminal station receives said search wording of a telegram return an identification data sequence added to this search wording of a telegram to the 1st radio terminal station.

(5) Memorize an identification data sequence of a returned radio terminal station as a transmission path to said 2nd radio terminal station in the 1st radio terminal station.

(6) When two or more identification data sequences of said radio terminal station are received memorize these from a high thing of a priority. A transmission path searching method characterized by things.

[Claim 3] A radio network system which has two or more radio terminal stations arranged arbitrarily comprising:

It is 1 or the memorized table about a transmission path [ as opposed to each of other radio terminal station to each radio terminal station ].

A means to broadcast this wording of a telegram again when a transmission path which contains a local station in a means to read one transmission path from said table and to add and transmit to said wording of a telegram when transmitting wording of a telegram to other radio terminal stations and wording of a telegram which received from other radio terminal stations is added.

[Claim 4] In a radio network system of claim 3, said table stores a high priority transmission path which receives other radio terminal stations, and said transmitting means sequentially reads a transmission path from said table from a high priority and transmission is successful, and is characterized by forming a means to update said table for a transmission path in which transmission succeeded as a transmission path of the highest priority further.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the transmission path searching method which searches for the transmission path of wording of a telegram in this system about radio network systems such as wireless LAN which transmits and receives data by radio.

[0002]

[Description of the Prior Art] Although the network system which sends and receives data among two or more terminal units was put in practical use variously now, these systems were systems which send and receive data via the transmission line of a cable altogether. For this reason, construction of the transmission line was needed between each terminal unit, time and effort is taken, and also there was a fault to which arrangement of a terminal unit becomes fixed.

[0003]

[Problem(s) to be Solved by the Invention] Then, although the data transmission and reception by radio was proposed, the data transmission and reception by the conventional radio was a method with which the transmitting station and receiving station of data communicate directly. Therefore, it was not able to be communicated in the range which an electric wave reaches. Since data is transmitted and received between the terminal stations in the distance beyond this, a repeater may be installed, but there was a fault which requires cost excessive for installation.

[0004] The purpose of this invention is as follows.

Provide the radio network system which solved the aforementioned problem by installing a radio terminal station in mesh texture and transmitting data by making other radio terminal stations into a relay station.

Provide an effective transmission path searching method in this radio network system.

[0005]

[Means for Solving the Problem] [1] In two or more radio terminal stations arranged

arbitrarily a transmission path searching method concerning claim 1 of this application is (1). The 1st radio terminal station transmits search wording of a telegram addressed to the 2nd radio terminal station.

(2) When other radio terminal stations receive this search wording of a telegram add and broadcast identification data of this radio terminal station again to this search wording of a telegram.

(3) It is (2) until the 2nd radio terminal station receives said search wording of a telegram. Operation is repeated.

[0006](4) When the 2nd radio terminal station receives said search wording of a telegram return an identification data sequence added to this search wording of a telegram to the 1st radio terminal station.

(5) Memorize a returned identification data sequence as a transmission path to said 2nd radio terminal station in the 1st radio terminal station. It is characterized by things.

[0007][2] In two or more radio terminal stations arranged arbitrarily a transmission path searching method concerning claim 2 of this application is (1). The 1st radio terminal station transmits search wording of a telegram addressed to the 2nd radio terminal station.

(2) When other radio terminal stations receive this search wording of a telegram add and broadcast identification data of this radio terminal station again to this search wording of a telegram.

(3) It is (2) until the 2nd radio terminal station receives said search wording of a telegram. Operation is repeated.

[0008](4) When the 2nd radio terminal station receives said search wording of a telegram return an identification data sequence added to this search wording of a telegram to the 1st radio terminal station.

(5) Memorize an identification data sequence of a returned radio terminal station as a transmission path to said 2nd radio terminal station in the 1st radio terminal station.

(6) When two or more identification data sequences of said radio terminal station are received memorize these sequentially from a high thing of a priority. It is characterized by things.

[0009][3] A radio network system concerning claim 3 of this application equips with the following a radio network system which has two or more radio terminal stations arranged arbitrarily.

It is 1 or the memorized table about a transmission path [ as opposed to each of other radio terminal station to each radio terminal station ].

A means to read one transmission path from said table and to add and transmit to said wording of a telegram when transmitting wording of a telegram to other radio terminal stations.

A means to broadcast this wording of a telegram again when a transmission path which contains a local station in wording of a telegram which received from other radio terminal stations is added.

[0010][4]A radio network system concerning claim 4 of this applicationIn a radio network system of claim 3said tableFrom a high thing of a priorityhave memorized two or more transmission paths which receive other radio terminal stationsand said transmitting meansIt is a means which repeats trial until it reads a transmission path from said table sequentially from a high thing of a priority and transmission is successfuland a means to update said table for a transmission path in which transmission succeeded as a transmission path of the highest priority further was formed.

[0011]

[Function]The 1st radio terminal station transmits the search wording of a telegram addressed to the 2nd radio terminal station (the target radio terminal station)and the transmission path searching method of this invention relays itother radio terminal stations adding the identification data of a local station until it reaches the 2nd radio terminal station in this search wording of a telegram. When this search wording of a telegram reaches the 2nd radio terminal stationthe identification data sequence added to that search wording of a telegram is returned to the 1st radio terminal station. This identification data sequence expresses the sequence of the radio terminal station until the wording of a telegram of said 1st radio terminal station results in the 2nd radio terminal station.

[0012]Since the identification data sequence is added in order of the relayed radio terminal stationthis identification data sequence serves as a transmission path (relay path) of the wording of a telegram towards the 2nd radio terminal station from the 1st radio terminal station. When the 1st radio terminal station memorizes this identification data sequenceand addressing to the 2nd radio terminal station and transmitting wording of a telegramsuch as dataafter thatwording of a telegram can be certainly transmitted by specifying this transmission path and transmitting.

[0013]In the radio network system of this inventioneach of the installed radio terminal station is provided with the table which memorized the transmission path over each of other radio terminal station. When a radio terminal station transmits wording of a telegram to other radio terminal stationsa transmission path is read from said tableand this is added to wording of a telegramand it transmits. Since the local station is specified as a transmission path when the data which specifies a local station as the transmission path added to the wording of a telegram which received is containedthe radio terminal station on the transmission path which received this wording of a telegram relays and broadcasts this again. Even if it does not install a repeaterby giving such a function to each radio terminal stationdata can be transmitted and received between the radio terminal stations which distance left.

[0014]

[Example]Drawing 1 is a figure showing the outline composition of the radio network system which is an example of this invention. Two or more radio terminals 1a-1k which constitute this system are installed by arbitrary arrangementand are identified in the address a - the address krespectively. In the figurethe small-gage wire has tied the radio terminals which are within the limits of the range of an

electric wave. Such a radio network system is realized by the radio point of sales system which connected by network the POS terminal of the large-sized store on radio and the wireless LAN system which radio-ized each node station.

[0015] Drawing 2 is a figure showing the composition of said radio terminal. The radio terminal 1 is controlled by the controller 10. The controller 10 comprises a microcomputer and performs transmit/receive control of data. The transmitter-receiver 11 and Data Terminal Equipment 13 are connected to the controller 10. The antenna 12 is installed in the transmitter-receiver 11. In the case of a radio point of sales system Data Terminal Equipment 13 is a POS terminal main part. At the time of data transmission the controller 10 edits into wording of a telegram the data which Data Terminal Equipment 13 outputs and sends it into the transmitter-receiver 11. At the time of data receiving the controller 10 extracts data from the wording of a telegram which the transmitter-receiver 11 received and inputs it into Data Terminal Equipment 13.

[0016] In such a radio network system in searching for the transmission path of the wording of a telegram to other radio terminals from one radio terminal it performs the following processings. The following explanation shows the example of the transmission path search to e station from a station.

- [0017] (1) Transmit search wording of a telegram from a station to e station.  
(2) Since the transmission data length of a station is to b station the search wording of a telegram which a transmitted does not reach e station. However the search wording of a telegram addressed to e station is received by b station.  
(3) a station waits for the reply from a fixed time e station.  
(4) Although b station waits for the reply from a fixed time e station when there is nothing reply having added one's address (identification data) b and having received search wording of a telegram to a station.  
(5) b station which received the request of a station broadcasts search wording of a telegram again after this operation. The address of b station is added to this search wording of a telegram.  
(6) Although the wording of a telegram which b station transmitted reaches c and d station it does not reach e station.  
(7) b station waits for the reply from e station fixed time.  
(8) Although c station and d station also wait for the answer from e station when there is this [ no ] reply having added the self addresses c and d and having received search wording of a telegram to b station.  
(9) b station requests relay transmission in order of an address. That is relay transmission is first requested to c station.  
(10) c station changes to a station and b station and transmits search wording of a telegram again.  
(11) Since the transmission data length of c has reached to e station e station replies the reply signal Ack to this search wording of a telegram.  
(12) Next d station transmits search wording of a telegram similarly and receives Ack of e station.  
(13) c station and d station transmit to b station that transmission of c→e and d→

>e is possible respectively.

(14) b station which received this wording of a telegram transmits to a station that transmission of b->c->e and b->d->e is possible.

(15) According to the transmission path received from b station a station recognizes that transmission to e station is possible and memorizes these route data (a->b->c->e a->b->d->e) on a table.

[0018] Although the above search operation may be made to perform any time generally it performs at the time of new radio terminal installation etc. at the time of a system construction. It may be made to perform periodically for every fixed time.

[0019] Thus the transmission path for which it was searched is memorized on a table as shown in drawing 3. This table 30 shows one of the tables which all the radio terminals have memorized. Each terminal unit has memorized such as the transmission path tables 30a and 30b to each of other terminal units from the local station which is this part. The storage area to one terminal unit has composition shown in the figure (B) from one terminal unit of said table. That is since the transmission path over other radio terminals may not be restricted in one kind but may exist from a certain radio terminal he is trying to memorize these courses altogether sequentially from the high thing of a priority. [ many ] The priority makes the high priority the course with usually few relay stations. The method of prioritization such as making high the priority of the course for which communication normal at the time of the actual employment to which the response at the time of search makes the quick course a high priority besides this was possible can be considered. A priority may be made to be updated during employment.

[0020] Drawing 4 is a figure showing the composition of the wording of a telegram which said radio terminal station transmits. Wording of a telegram consists of the identification bit 21 the receiving station address 22 the transmitting station address 23 the destination address 24 the sending office address 25 the transmission path information 26 and the data body 27. The identification bit 21 is a bit for identifying whether this wording of a telegram is the usual wording of a telegram or it is search wording of a telegram. When this bit is 0 it is the usual wording of a telegram. A receiving station is this terminal unit that carries out wording-of-a-telegram direct reception. A transmitting station is the terminal unit which transmitted this wording of a telegram directly. An address is a terminal unit which this wording of a telegram should be made to reach eventually. The sending office is the terminal unit which edited this wording of a telegram and transmitted first. The transmission path information 27 is information on the transmission path which the sending office chose from said table and transmission and reception are repeated in order of the address currently written in this transmission path information 27. When a terminal unit is a POS terminal the data body consists of sales data etc.

[0021] On the other hand an identification bit is 1 the receiving station address 22 is not written in and also in the case of the wording of a telegram for path

planningthere is no distinction of the transmission path information 26 and the data body 27the relayed terminal unit writes in transmission path information itselfand it dies to it.

[0022]Drawing 5 – drawing 7 are flow charts which show operation of each radio terminal.

[0023]Drawing 5 is a flow chart which shows the usual send action. Generating of the data which should be transmitted to a certain device will read the transmission path of the highest priority over the terminal unit from said table (n1). This transmission path information is added to the data body by which it was generatedwording of a telegram is edited (n2)and this wording of a telegram is transmitted (n3). He waits for the time reply proportional to the transmission path information (n4). When the reply signal Ack is received to within a time [ this ]operation is finished as it is as that in which transmission of data succeeded (n5). When Ack is not received in standby timein the courseit judges that transmission of data was not completedother transmission paths over the same terminal unit are chosen from a tableit adds to data (n6)and wording of a telegram is transmitted again (n3) (n4). The above operation is repeated until transmission is successful.

[0024]Drawing 6 is a flow chart which shows receiving operation. This operation will be performed if wording of a telegram is received from other radio terminals. It is judged whether the address of the wording of a telegram which received first is an address of a local station. In addressed to a local stationit answers to the sending office of the wording of a telegram (n15). This response is also edited into the form of the wording of a telegram of drawing 4. In not being the wording of a telegram addressed to a local stationit judges whether it is search wording of a telegram (n11). It is not search wording of a telegramand if it is the usual wording of a telegramthis wording of a telegram will be unrelated to a local stationwill come outandfor a certain reasonwill finish operation as it is. On the other handin the case of search wording of a telegramafter checking that the terminal unit of the address of the wording of a telegram does not answer (n12)it answers to the transmitting station (n13).

[0025]Drawing 7 is a flow chart which shows path planning operation. Search wording of a telegram is transmitted by making the address of a distant office to set a course first into an address (n20). It waits for the answer from the destination station fixed time (n21). There is no answer from a destination stationit requests to act as intermediary to the officewhen there is an answer from offices other than a destination station (n25) (n26)and search wording of a telegram is transmitted again (n20). Repeat execution of this operation is carried out until there is an answer from a distant office in n21. If there is an answer from a destination stationit will progress to n22 from n21. In n22the transmission path of a to [ the table of drawing 3 / the destination station ] from a local station is written in. In this casewhen transmission of wording of a telegram is successful in two or more coursesall the courses are written in sequentially from the high thing of a priority. It is made for a thing with few quick numbers of thing relay stations of

response time to a priority to become high. On the other hand from every radio terminal when there is no response (n25) the setting position of this terminal unit outputs the error message of a bad purport (n30).

[0026]

[Effect of the Invention] In two or more radio terminal stations which have been arranged arbitrarily according to the transmission path searching method of this invention Since it can set up automatically when other radio terminal stations act as intermediary even if it is the terminal stations which they left when setting up the transmission path for two arbitrary games communication of the left terminal stations is realizable without a repeater. It becomes possible to perform setting out of a transmission path automatically without a help in this case.

[0027] According to the radio network system of this invention data can be transmitted using the transmission path set up by methodssuch as the above-mentioned transmission path searching method and communication of the left terminal stations can be realized without a repeater. In this case in order to choose the high transmission path of a priority and to transmit efficient data communications become possible.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The figure showing the composition of the radio network system which is an example of this invention

[Drawing 2] The figure showing the composition of the radio terminal used for the radio network system

[Drawing 3] The figure showing the transmission path table memorized by the radio terminal

[Drawing 4] The figure showing the composition of the wording of a telegram transmitted with the radio network system

[Drawing 5] The flow chart which shows operation of the radio terminal

[Drawing 6] The flow chart which shows operation of the radio terminal

[Drawing 7] The flow chart which shows operation of the radio terminal.

[Description of Notations]

1(a [ 1 ]-1k)-radio terminal 26-transmission path information 30-table.

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